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(71) Applicants
Jerald Lee Tennant,
806 Greentree Court,
Duncanville, Dallas
County, Texas 75137,
United States of America,
Heinz Joseph Smirmaul,
1207 Spring Lake Drive,
Duncanville, Dallas
County, Texas 75116,
United States of America

(72) Inventors
Jerald Lee Tennant,
Heinz Joseph Smirmaul

(74) Agents
Carpmaels and Ransford,
43 Bloomsbury Square,
London WC1A 2RA

(54) Circular keratotomy with insert
for myopia correction

(57) A space maintainer (e.g. ring)
(50) is provided for use in a circular
keratotomy surgical procedure. Space
maintainer (50) is inserted in an

incision (30) cut into the cornea (20)
of an eye (22) of a patient. The
incision (30) circumscribes the optical
zone (32) of the eye (22) to cause the
cornea (20) to flatten (34). Space
maintainer (50) maintains the cornea
(20) in the flattened position (34).

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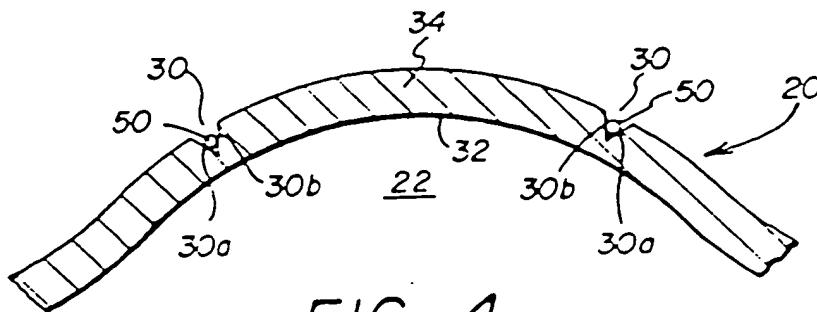


FIG. 4

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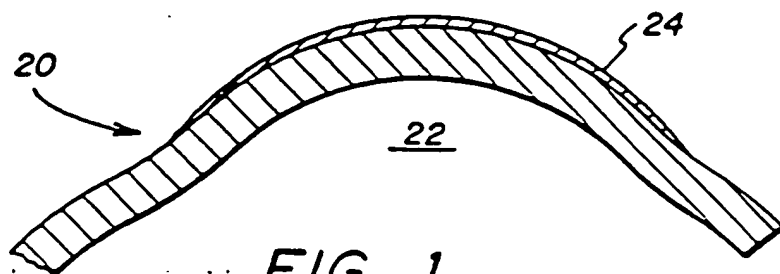


FIG. 1

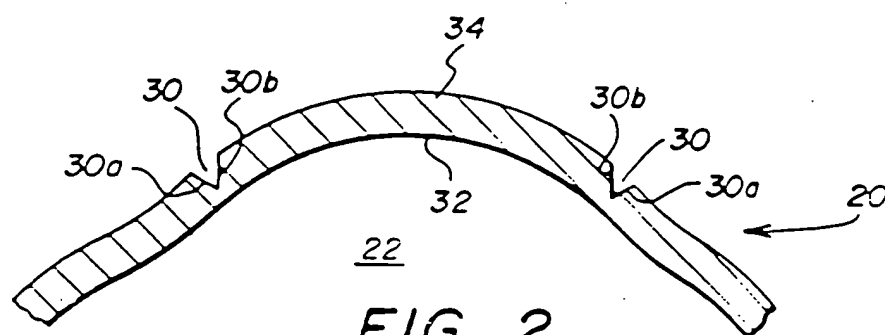


FIG. 2

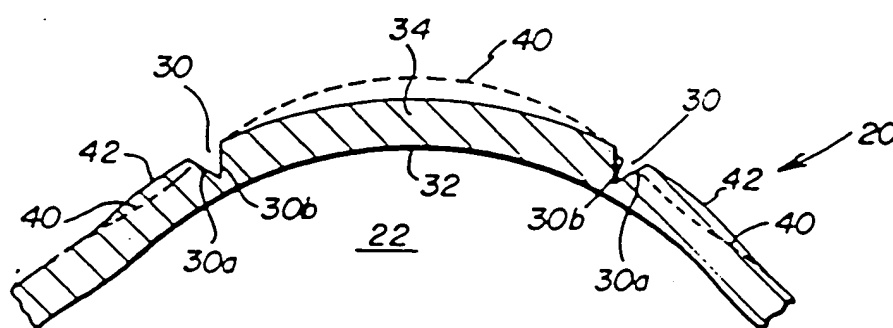


FIG. 3

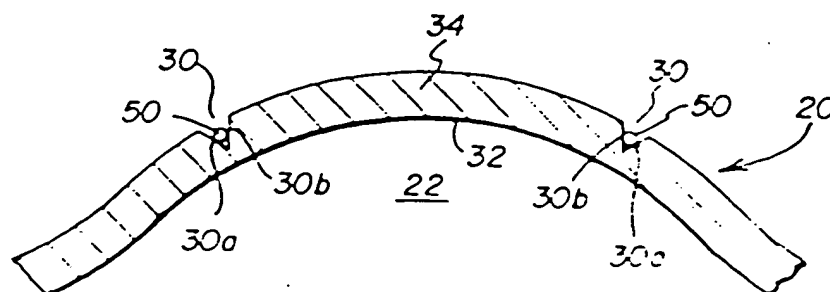


FIG. 4

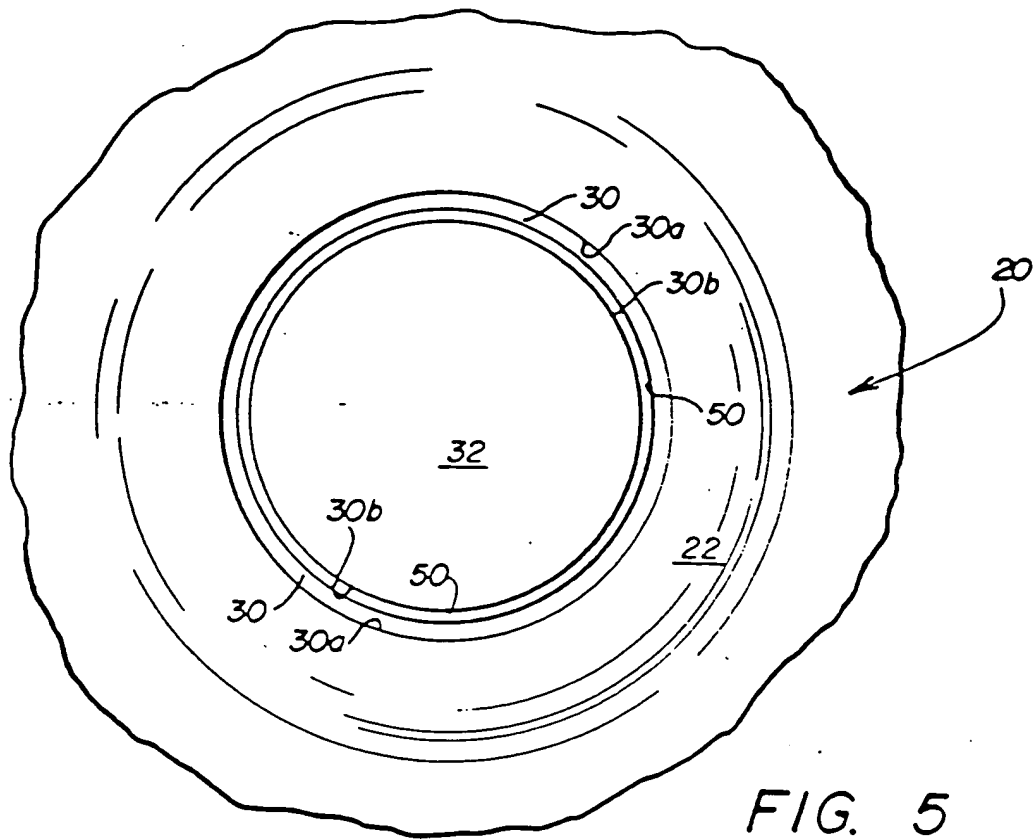


FIG. 5

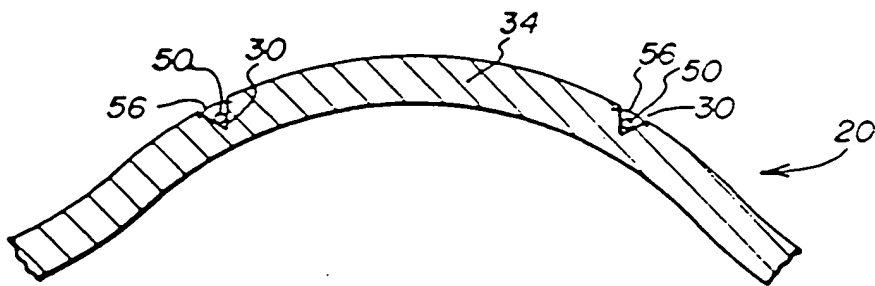


FIG. 6

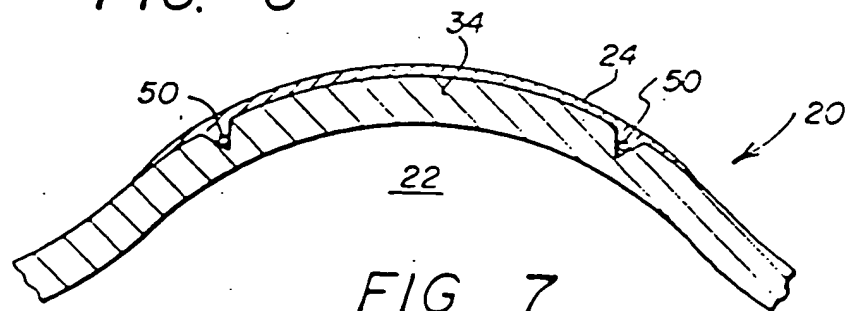
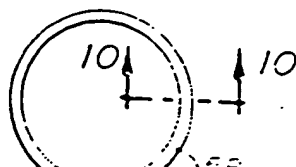
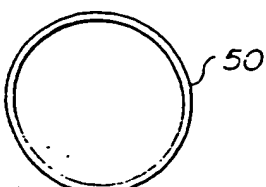


FIG. 7



[illegible]

to the present invention. Cornea 20 includes epithelial layer 24.

FIGURE 2 illustrates eye 22 with epithelial layer 24 removed. A circular groove 30 is cut in cornea 20 to a depth of approximately 0.2 to 0.7 millimeters. Circular groove 30 circumscribes the optical zone, generally identified by the numeral 32 of eye 22 and has a diameter of approximately eight millimeters. It therefore can be seen that circular groove 30 is disposed away from optical zone 32 to eliminate glare sensitivity heretofore associated with radial keratotomy procedures. Circular groove 30 has a width of approximately 0.2 millimeters and is defined by sidewalls 30a and 30b. Circular groove 30 can be formed using a corneal trephine in which the depth of cut can be precisely controlled.

FIGURE 3 illustrates the results of the incision of circular groove 30 within cornea 20. The incision of circular groove 30 in cornea 20 induces peripheral cornea staphyloma resulting in central corneal flattening in the area of optical zone 32. The curvature of cornea 20 in the area of optical zone 32 is reduced to thereby compensate for axial myopia. In comparing FIGURES 2 and 3, it can be seen that central corneal area 34 of cornea 20 has flattened from the position illustrated in FIGURE 2. This initial position is illustrated in FIGURE 3 via the dotted line 40. It can also be seen in FIGURE 3 that peripheral portions 42 of cornea 20 have protruded above their initial position, being higher than line 40. The flattening of central corneal area 34 results in the shortening of eye 22 to correct for myopia and in a flatter and therefore optically weaker cornea.

Referring simultaneously to FIGURES 4 and 5, the insert of the present invention is illustrated, and is generally identified by the numeral 50. Insert 50 is disposed within circular groove 30 for maintaining sidewalls 30a and 30b of circular groove 30 apart during healing of the incision which forms circular groove 30. Insert 50 forces and maintains sidewalls 30a and 30b apart until sufficient scarring tissue closes circular groove 30 to thereby maintain central corneal area 34 of cornea 20 in the flattened position shown in FIGURE 3. Insert 50 may comprise, for example nylon, extruded PMMA, polypropylene or similar materials.

FIGURE 6 illustrates the use of sutures 56 for temporarily maintaining insert 50 in place within circular groove 30 during healing of the incision forming circular groove 30.

FIGURE 7 illustrates insert 50 permanently in place by normal scarring which has taken place between sidewalls 30a and 30b of circular groove 30. FIGURE 7 further illustrates a newly grown epithelial layer 24.

FIGURE 8 illustrates insert 50 in greater detail. Insert 50 comprises a circular ring having a

diameter of approximately eight millimeters. Circular ring 50 has a circular cross-sectional area having a diameter of approximately 0.1 to 0.5 millimeters.

FIGURE 9 illustrates an insert 58 for insertion into circular groove 30 (FIGURE 4) having a configuration similar to insert 50. Insert 58 has a triangular cross-sectional area as illustrated in FIGURE 10 for more closely matching sidewalls 30a and 30b of circular groove 30 when inserted. The length of a side of insert 58 is approximately 0.3 millimeters.

It therefore can be seen that the present circular keratotomy for myopia correction provides for a circular incision circumscribing the optical zone of an eye. The circular incision is disposed away from the optical zone to avoid glare sensitivity heretofore present with radial keratotomy surgical procedures. The depth of the circular incision and the diameter of the incision control the amount of central cornea flattening and the resulting correction. The present invention further provides for an insert for maintaining the cornea in a flattened position to prevent the cornea from returning to its original error. The insert maintains the incision open thereby permitting corneal flattening until normal scarring takes place.

Whereas the present invention has been described with respect to specific embodiments thereof, it will be understood that various changes and modifications will be suggested to one skilled in the art and it is intended to encompass such changes and modifications as fall within the scope of the appended claims.

CLAIMS.

1. A space maintainer for use in corneal keratotomy wherein an incision is made into the cornea of a patient, the incision circumscribing the optical zone of the eye to cause the cornea to flatten comprising:

means for insertion into the circular incision for maintaining the cornea in the flattened position.

2. The space maintainer of Claim 1 wherein said means for insertion comprises ring means.

3. The space maintainer of Claim 2 wherein said ring means has a circular cross-sectional area.

4. The space maintainer of Claim 2 wherein said ring means has a triangular cross-sectional area.

5. A method for surgical correction of myopia comprising the steps of:

cutting an incision into the cornea of a patient circumscribing the optical zone thereby causing the cornea to flatten; and

inserting a spacer into the incision for maintaining the cornea in the flattened position.

6. A space maintainer for use in cornea

keratotomy substantially as herein described with reference to and as illustrated by the accompanying drawings.

7. A method for surgical correction of myopia
5 substantially as herein described with reference to and as illustrated by the accompanying drawings.

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